

## 20.10: Solving a System of Equations

- Solving a system of equations is finding the coordinate(s) where the graphs of the 2 equations intersect

- 2 parts to a coordinate, we will have to solve for  $x$  and  $y$

Recall: 4 ways to solve a quadratic

1) Factoring - quickest / easiest method  
but may not always work.

2) Quadratic Formula:

$$x = \underline{\hspace{2cm}}$$

3) Complete the Square

4) Graphing to find x-intercepts (zero)

## Solving a system algebraically

- 1) Solve either equation for whichever variable is easiest to solve for.
- 2) Substitute into the other equation and solve for the variable.
- 3) Substitute the numeric value from Step 2 into either original equation to find the other variable
- 4) State the coordinates of intersection
- 5) check - graphically

Ex: Solve the system Algebraically

$$(1) y = x^2 - 2x + 1 \quad (2) y - x = 1$$

## Solving a System Graphically

- 1) Solve both equations for  $y$
- 2) Type both equations into  $Y_1, Y_2$  on your calc.
- 3) Set up an appropriate viewing window, always start with Zoom 6
- 4) Find the intersections with  

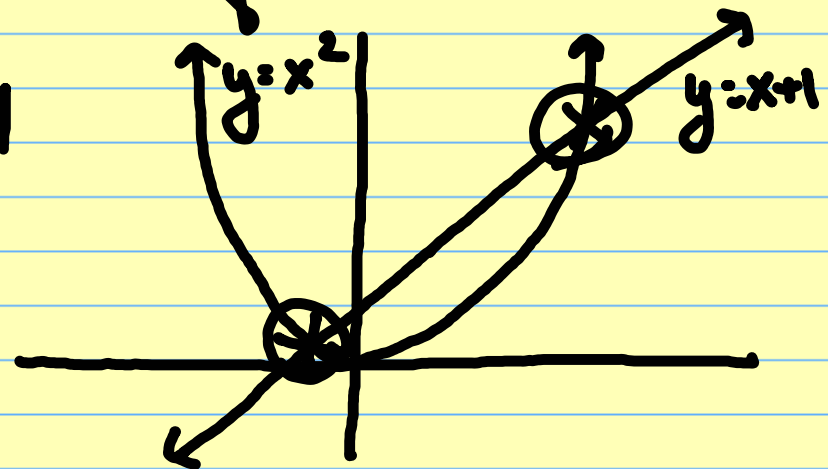
2 <sup>nd</sup>	Trace
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 $\rightarrow$  intersect

## Work you must show to solve graphically

- 1) you must show both equations in  $y =$  form
- 2) a quick sketch of your graph highlighting the intersections
- 3) state the coordinate(s) of the intersection(s)

Ex) (1)  $y = x^2$  (2)  $y = x + 1$   
 intersect @  $(x, y)$   
 and  $(x, y)$



Ex: Solve the following System Graphically

$$(1) y-1 = x^2 - 2x \quad (2) y-x = 1$$

Ex: Solve algebraically and check  
graphically

$$(1) y = x^2 - 2x + 3 \quad (2) 2x - y = 2$$



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46 / 57 102% Find

equations.

~~In 5-12, solve each system of equations graphically and check.~~

5.  $2x - y = 5$   
 $3x + 2y = 4$

6.  $x^2 + y^2 = 10$   
 $y = 3x$

7.  $9x^2 + y^2 = 9$   
 $3x - y = 3$

8.  $y = x^2 - 4x + 3$   
 $y = x - 1$

9.  $x^2 - y^2 = 9$   
 $y = 4$

10.  $xy = 8$   
 $y = x + 2$

11.  $y = -x^2 + 4$   
 $y = x + 2$

12.  $x^2 + y^2 = 8$   
 $x + y = 4$

~~In 13-20, solve each system of equations algebraically and check.~~

13.  $x^2 + 4y^2 = 4$   
 $x = 2y - 2$

14.  $y = x^2 - 3$   
 $x + y = -1$

15.  $y = 2 - x^2$   
 $y = 2x + 4$

16.  $x^2 + y^2 = 16$   
 $x - y = 4$

17.  $xy = -6$   
 $x + 3y = 3$

18.  $9x^2 - 4y^2 = 36$   
 $y = 3x - 6$

19.  $x^2 + y^2 = 18$   
 $x + y = 6$

20.  $x^2 - 2y^2 = 11$   
 $y = x + 1$

~~In 21-28, for each quadratic-linear system of equations:~~

a. Solve graphically. (If the graphs do not intersect, write "No real roots.")

b. Solve algebraically, whether the roots are real or imaginary.

c. Check the roots in the equations.

21.  $y = x^2 + x - 4$   
 $y = 2x - 2$

22.  $y = x^2$   
 $2x + y = -2$

23.  $x^2 + y^2 = 25$   
 $y = x - 1$

24.  $xy = 12$   
 $y = 2x + 2$

25.  $y = 2x - x^2$   
 $y = 2x + 1$

26.  $y = x^2 + 4x + 1$   
 $y = 2x + 1$

27.  $x + y = 2$   
 $xy = 12$

28.  $x^2 + (y - 2)^2 = 4$   
 $x = -3$

29. a. Draw the graphs of  $25x^2 + 4y^2 = 100$  and  $y = 2x + 5$  on the same set of axes.  
b. How many solutions does this system have?  
c. Solve the system algebraically to obtain the exact values of the roots.  
d. Use a calculator to check the solution you obtained in part c.

Pg 965: 8, 11, 14, 15, 21, 26, 27  
Solve Algebraically and check graphically

$$26. \quad y = x^2 + 4x + 1$$

$$y = 2x + 1$$